

# Based on the concept of translational medicine in the exploration and practice of teaching reform of pathophysiology<sup>\*</sup>

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<sup>\*</sup>Fund Project: The research project of higher education classroom teaching reform in Zhejiang province (NO: kg2013229)

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**Received:** Oct 17, 2015

**Accepted:** Oct 26, 2015

**Published:** Jan 19, 2016

**DOI:** 10.14725/gjicmwm.v3n3a1349

**URL:** <http://dx.doi.org/10.14725/gjicmwm.v3n3a1349>

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## Abstract

**Objective:** To investigate the application of the teaching mode in pathophysiology, based on the thought of translational medicine and combined basic medicine with clinical medicine. **Methods:** Choosing the five-year period medical undergraduates in our university, who were enrolled in the year of 2012, through developing comprehensive case-based teaching (CCBT) in large class teaching, having case-problem based learning (CPBL) in small class teaching, and carrying out comprehensive open experiments during the experiment teaching, the pathophysiology teachers participated in clinical (internal medicine) practice, to apply the concept of translational medicine into Pathophysiology teaching reform, setting up a teaching mode, which was based on the thought of translational medicine and combined basic medicine with clinical medicine. **Results:** This model of education further stimulated students' interest in study, enlightened their creative thought, enhanced the initiative of students greatly, raised students' ability to think and solve problems independently. At the same time, it improved the teachers' teaching level, and made this curriculum serving as a bridge between basic medicine and clinical medicine. **Conclusion:** The pedagogical reform of pathophysiology, which was based on the idea of translational medicine, improved educational effect and was worthy to be applied further.

## Key words

Pathophysiology; Teaching reform; Teaching effect; Translational medicine

Translational medicine also known as translational research, the core can bring the basic research achievement of medical biology effectively into clinical practical application of the theory, technology, method and medicine. Realization of laboratory, To achieve the fast channel between the laboratory and the ward<sup>[1]</sup>. The current medical education system in our country has been a serious disconnection between basic and clinical medical education, in order to reform the mode of traditional medical education, which has divorced from reality. It's sure that one of the most effective ways to promote our country's medical educational reform is translational medicine<sup>[2]</sup>.

Pathophysiology is main to research the law and mechanism of the disease occurrence and development, it is a communication bridge subject between basic medicine and clinical medicine, which establish a good theoretical foundation for the clinical study and play an important role in medical education. The requirement of pathophysiology teaching is combine basic medicine with clinical medicine. Therefore, it is very necessary to cultivate the idea of translational medicine and use the idea of translational medicine to guide the education reform of pathophysiology. How to introduce the idea of translational medicine into pathophysiology teaching reform, we try to do the following.

## **1 In the pathophysiology theory teaching, build the teaching reform of combining basic medicine with clinical medicine, which guide by the idea of translational medicine**

The current medical education reform emphasizes the combination of medical education and clinical application, so as to solve the phenomenon of the separation from basic to clinical. But the idea of translational medicine emphasizes the two-way transformation idea between basic and clinical. So the basic medical education must consider the clinical application, clinical practice should timely feedback to the basic medical education<sup>[3]</sup>. The appearance of translational medicine is in order to eliminate the barrier between basic and clinical, provides a new way to strengthen the cultivation of clinical thinking ability, we take pathophysiology theory teaching as an opportunity. Meanwhile, bring the idea of translational medicine into the teaching reform of pathophysiology.

1.1 Carry out comprehensive case-based teaching method in the big class Comprehensive case-based teaching also called case based learning, the teaching method is based on a comprehensive case, students through the analysis of specific cases, to grasp the general analysis principle, and using the principle to analyze and solve problems independently. The main task of pathophysiology is to study the sick body's function, metabolism changes and its mechanism, so as to explore the nature of the disease, and provide a theoretical basis for the prevention and treatment of diseases. The course has strong theoretical, covering a wide range, content abstract. For example, if only using the traditional teaching method, students may feel boring, hard to remember, learning effect is not good, what's more, the students enthusiasm is not high, so the combination of cases in the teaching process is very important.

Comprehensive case-based teaching is a new teaching method which has adopted in medical education reform of China in recent years. The biggest advantage is it can arouse the students' interest in learning, motivate the students' learning desire, improve the understanding of theoretical knowledge and the ability of comprehensive using. Ultimately, it can improve students' ability to analyze and solve problems independently<sup>[4]</sup>. But the comprehensive case-based teaching is main in small classes or group discussion, and most medical colleges have large students numbers, however, the number of teachers is small, large classes is still dominant<sup>[5]</sup>.

We use the textbook "pathophysiology" that published by Science Publishing House (case edition, Second Edition), reflect the school "early clinical, more clinical, clinical repeated" teaching objectives, combined with the actual situation of Renji college of Wenzhou Medical University, carry out the comprehensive case-based teaching in five years undergraduate big class. In the teaching of pathophysiology, before teacher teach a new content, according to the teaching objective, using the corresponding case. Teach topic, pose questions, and give students some time to think, let the students bring with the case and problem into classroom learning, then the teacher begin to teach the class content, combine with the multimedia courseware of related cases, guide students to analyze and solve problems, highlight the characteristics of the problem as the center, the case as the main line.

After several years teaching practice, the teaching method has been affirmed by the students, supervisors and school, achieved good teaching effect. With the analysis of student forum after class and the questionnaires, comprehensive case-based teaching method in the big class can improve students' interest in learning, stimulate students' thirst for knowledge, improve the comprehensive analysis ability, it is helpful to cultivate the students' clinical thinking ability.

1.2 Carry out case-problem based learning method in the small class In order to better reflect the training objectives of students as the center, the pathophysiology theory teaching in five years undergraduate clinical medical students has adopt the method of case-problem based learning. Let the students stand on the platform to experience the whole process of teaching as a teacher, to achieve the exchange of roles. Using this method can stimulate students interest in learning, learning initiative, improve the students' memory of learn knowledge and comprehension ability, cultivate the students' self-learning ability and the ability to solve problems<sup>[6]</sup>.

Case-problem based learning can be roughly divided into three basic parts, namely the introduction of cases, case discussion, summary. (1) The introduction of cases: In addition to the teaching cases of case-problem based

learning, teacher also can introduce some feelings, anecdotes, anecdotes about writing cases to arouse the attention of students, necessity, the teachers can use some other means to remind students to pay attention to the content. (2) Case discussion: It can be divided into 4 stages, beginning, discuss problems, offer alternative scheme and discuss how to carry out. A typical case discussion is always link with the following discussions. For example, what is the problem in the case? Which information is very important? What are the methods to solve the problems? What is the decision criteria? What kind of decision making is most appropriate? How to make a plan? When and how to put the plan into action? How to carry out the overall evaluation? (3) Summary: Through the discussion of the case can draws some conclusions, it also can prepare for the following classroom teaching. During the interim, let the students sum up the content, it also can be summarized by the teachers themselves. Indicate the key points in the case, discuss the shortcomings and strengths. Conclude the content need to reveals the theory of the cases, reinforce the content discussed in the past, prompt a follow-up case, treat the participants with encouragement. At the end of the reporting, teachers, other groups and the members of this group make evaluation successively, feedback the teaching effect, and solve the problems successively. In this way, it can improve the quality of teaching.

Case-problem based learning method is always carrying on the students as the center, the teaching atmosphere is relaxed and lively. Through the feedback of multi-channel teaching objective effect, case-problem based learning method not only make students impressive, but also can play students' learning initiative, strengthen students' autonomous learning ability, increase the sense of teamwork and improve the comprehensive quality. Case-problem based learning method as an important teaching means for basic teaching and clinical teaching, at the same time, it also reflect the idea of translational medicine.

## **2 In pathophysiology experimental teaching, carry out an open comprehensive experiment, promote the combination of theory and practice**

Experimental teaching is an important medical education in the practice teaching. It plays an important and irreplaceable role in the student's raise aspect of practice ability, the ability to apply knowledge and scientific innovation ability. In pathophysiology experimental teaching, it has reduced the proportion of basis and verification experiment, greatly increased the general open experiment that can cultivate innovation ability of scientific research, all of these has achieved good results. For example, in the comprehensive experimental acute right heart failure, the animal model of acute right heart failure should be built at the first, then observe the all indexes(blood pressure, heart rate, respiration, central venous pressure) changes before and after the experiment. Connect with the knowledge of Physiology and pathophysiology to analysis the disease's mechanism. At the same time, add the treatment of acute right heart failure, guide the students designed feasible solution according to the pharmacological knowledge, observe the treatment effect and the change of index, analysis the emergency mechanism. Finally, associate with animal experiments and clinical case, discuss the clinical treatment measures of right heart failure patients , then comprehensive analysis it.

Carry out the open comprehensive experiment is not only consolidate the theoretical knowledge, but also the experimental contents are linked to clinical, independent design the rescue plan. It is beneficial to the students to integrate theory with practice, improve the comprehensive application ability and innovation ability.

## **3 Pathophysiology teacher take part in clinical practice**

3.1 strengthen the professional teachers is essential to the pathophysiology teaching Pathophysiology as a basic medical theory course, its teaching content has a closely linked with clinical medicine. As a professional pathophysiology teacher must have good clinical medical knowledge and experience, including two aspects of clinical theory and clinical practice<sup>[7]</sup>.

Comprehensive case-based teaching and case-problem based learning are used by our staff room. During the report, they require a large number of clinical knowledge, also need to accumulate clinical data for the organization and preparation of the cases. But the pathophysiology don't have clinical experience and lack clinical ability. Therefore, pathophysiology full-time teachers go to the Affiliated Second Hospital for clinical practice in batches, mainly on the ways of medical observe, participate (main in internal medicine) in rounds and case

discussions. By entering the first-line clinical to participate the practice and understand new progress, new technology of the teaching content (such as disorder of water and electrolyte metabolism, acid-base balance disorders, shock, ischemia reperfusion injury, cardiac insufficiency, respiratory dysfunction, hepatic insufficiency, renal insufficiency, brain function is not complete and multiple organ dysfunction syndrome) clinical diagnosis, avoid the book knowledge break away from the actual. The first-hand clinical data collecting throughout the whole process. Typical clinical cases as the material of case teaching, and further improve the pathophysiology teaching work.

Through pathophysiology teachers make unremitting efforts to take part in clinical practice, continue to accumulate clinical experience and knowledge, and find hot issues in clinical practice, combined with clinical research, satisfied with the clinical needs, so as to improve the ability of scientific research. In this way, it not only improve the pathophysiology teaching level and the professional level of pathophysiology, but also helpful to the development of translational medicine.

3.2 Strengthen the professional teachers in clinical practice is the need for scientific research of pathophysiology Pathophysiology is an experimental subject about disease. In order to explore the regularity of occurrence and development of the diseases and its mechanism, pathophysiology professional teachers must be engaged in scientific research work. The research is to find problems, solve problems. To the pathophysiology scientific research, the main contents are: starting from the clinical diagnosis disease and epidemiology investigation practice, find and put forward the disease etiology or pathogenesis related to the subject, followed by clinical patients, animal models, in vitro organ, cell culture experiments are conducted to research will eventually obtained data and results of analysis, synthesis and return to clinical practice is verified in order to achieve the purpose of prevention and treatment of diseases. For example, ischemia can cause damage to tissues and organs function, but clinical practice found: sometimes, the tissue and organ has been restored the blood supply after treatment, but its function is increased damage. therefore, "reperfusion injury" has been put forward. The mechanism of how the latter happened has become a pathophysiology topic. Through the heart in vitro experimental study found that the mechanism is connected with the increase level of free radicals and intracellular calcium, after validation confirmed, the free radical scavenger and calcium antagonists can reduce or avoid the occurrence of reperfusion injury, which resulted in a significant increase efficacy in many existing ischemia-reperfusion reperfusion therapies, such as the of extracorporeal circulation in cardiac surgery, coronary bypass surgery and organ transplantation. Thus, put forward and solve the pathophysiology scientific research problem is inseparable from the clinical. The activity of pathophysiology scientific research is closely related to the clinical, the research results can provide the theory and practice for clinical, improve the disease prevention and control measures, or even occur major changes. If pathophysiology professional teacher don't take part in clinical practice and connect with patients and clinical medical persons, it is impossible to well understand the problems in the diagnosis and treatment of diseases. It is hard to carry out the research project of a good development of clinical practical significance. It is difficult to achieve this discipline to explore nature of the disease, promote disease prevention and treatment research purposes.

I think, only pathophysiology professional teachers often participate in the clinical practice, can we able to find the actual problems existing in the practice of medicine, try to study and solve the problem, make our own research work better with clinical practice, render a service for clinical and the development of the medical more effectively.

Translational medicine is one of the main directions of the medicine development. The idea of translational medicine can be apply in the reform of pathophysiology teaching, explore and try to use different teaching modes and teaching methods to promote the combination of basic and clinical, solve the problem of the disconnection between basic and clinical, cultivate the students' clinical thinking ability. The present study is only in a preliminary exploration and practice stage, many places need to further improve. We should fully understand the connotation of translational medicine, strengthen translational medicine consciousness, strengthen discipline

integration and cooperation, cultivate the practical medical talents that have the idea of translational medicine, ability and high quality.

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